UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/082,303	02/26/2002	Kiyoshi Honda	ASA-1068	2781

24956	7590	09/29/2004

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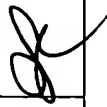| EXAMINER |
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| PATEL, HETUL B |

ART UNIT	PAPER NUMBER
2186	

DATE MAILED: 09/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)	
Office Action Summary	10/082,303	HONDA ET AL.	
	Examiner	Art Unit	
	Hetul Patel	2186	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>03</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 August 2004*.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21 and 23-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *25-27* is/are allowed.

6)☒ Claim(s) *1-4,6-12,14-20,23 and 24* is/are rejected.

7)☒ Claim(s) *5,13 and 21* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All   b)☐ Some *   c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *08/30/2004*.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Specification

1.   This action is responsive to communication filed on August 30, 2004. This amendment has been entered and carefully considered. Claims 1-21 and 23-27 are again presented for examination.

2.   The one of the two foreign patent documents,1998-014208, listed in the IDS filed on August 30, 2004 has been considered; the second foreign patent document, 1998-052698, has not been considered since it is not translated in English. If the Applicant wishes any further consideration, complete copy of the translated foreign document should be submitted in a new IDS.

3.   Certified Priority Documents for JP 2001-153345 and JP 2001-344010 filed on February 18, 2004 have been entered and carefully considered.

4.   All the objections cited in the previous office action have been withdrawn due to the Amendment filed on August 30, 2004.

5.   Applicant's arguments filed on August 30, 2004 have been fully considered but they are not persuasive.

6.   The rejection of claims 1-21 and 23-27 as in the Office Action mailed April 26, 2004 is respectfully maintained and reiterated below for Applicant's convenience.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7.   Claims 1-2, 9, 17 and 18 are rejected under 35 U.S.C. 102(b) as being

anticipated by Judd et al. (USPN: 5,768,623), hereinafter, Judd.

As per claims 1 and 9, Judd teaches a storage subsystem (see Fig. 3) comprising a

plurality of storage devices (array1 and array2 in Fig. 3) connected to a host computer

(20 in Fig. 3), wherein a first storage device (first disk in Fig. 3) included in said plurality

of storage devices comprises:

- a processor (router), means for executing information processing, indicated by

    the received request when the received request should be executed by the first

    storage device based on cooperation control information (the first byte of the

    address field) which indicates the request to be executed by the first storage

    device (e.g. see Col.9, lines 28-51), wherein each of the plurality of storage

    devices control RAID level cooperatively (e.g. see Col. 3, lines 61-65); and

- a receiver, means for receiving a request for information processing for the

    storage subsystem, and a transceiver, means for transferring the received

    request to a second storage device, are embedded in the first storage device of

    the system taught by Judd since first storage device of Judd's system receives

    the request for information processing from the host and transfers it to second

storage device if it has to executed by second storage device (e.g. see Col.9,

lines 41-51).

As per claim 17, Judd teaches a storage control method which uses a storage

subsystem (see Fig. 3) comprising a plurality of storage devices (array1 and array2 in

Fig. 3) connected to a host computer (20 in Fig. 3) and includes a first storage device

(first disk in Fig. 3), wherein the first storage device executes:

- a step for executing information processing indicated by the received request

   when the received request should be executed by the first storage device based

   on cooperation control information (the first byte of the address field) which

   indicates the request to be executed by the first storage device (e.g. see Col.9,

   lines 28-51), wherein each of the plurality of storage devices control RAID level

   cooperatively (e.g. see Col. 3, lines 61-65); and

- a step of receiving a request for information processing for the storage

   subsystem, and a step of transferring the received request to a second storage

   device, are embedded in the first storage device of the system taught by Judd

   since first storage device of Judd's system receives the request for information

   processing from the host and transfers it to second storage device if it has to

   executed by second storage device (e.g. see Col.9, lines 41-51).

As per claims 2 and 18, Judd discloses the claimed invention as described above

and furthermore, Judd teaches that the first and the second storage devices control

RAID level 1 (e.g. see Col. 3, lines 61-65). Judd also teaches that when a data request

is made by an application program to a first adapter through a host application

interface for data that is stored in a storage array not primarily controlled by the first

adapter, the data request is communicated through the adapter communication

interface to the adapter primarily controlling the storage array in which the requested

data is stored, i.e. if the data request is made, the second storage device requests the

first storage device to send stored data connection with the data write request to the

second storage device and stores data sent from the first storage device (e.g. see the

abstract).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8.   Claims 3, 8, 11, 16, 19 and 24 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Judd in view of Sato (JPPN: 410171559A).

As per claims 3, 8, 11, 16, 19 and 24, Judd discloses the claimed invention as

described above having the first information (the first byte of the address field) indicating

an address of the a memory area made from the plurality of storage devices that should

be executed by the information processing, and the cooperation control information

includes second information identifying an area of the first storage device of the memory

area of the plurality of storage devices (e.g. see Col. 9, lines 41-51). Judd does not

disclose that a processor (router), means for executing information processing,

executes the information processing when the first and second information match.

However, Sato, on the other hand, discloses that when the first and the second ID

storage part match by the collation, the discrimination circuit sends out connection

permission signals to an interface part. Accordingly, it would have been obvious to one

of ordinary skill in the art at the time of the current invention was made to implement the

Judd's system by adding a step which will prevent the means for executing information

processing from executing the information processing unless the first and second

information matches to prevent the loss and robbery of the information sent from the

host.

9.   Claims 4, 6-7, 12, 14-15, 20 and 23 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Judd in view of Kakuta (USPN: 5,583,876).

As per claims 4 and 20, Judd discloses the claimed invention as described above

and furthermore, Judd teaches that the storage subsystem wherein the second storage

device (second disk in the Fig. 3) comprises:

-   the processor (router), means for executing the information processing, indicated

    by the transferred request when the transferred request should be executed by

    the second storage device (e.g. see Col.9, lines 28-51); and

-   the receiver, means for receiving the transferred request, is embedded in the

    second storage device of the system taught by Judd since second storage device

    of Judd's system receives the request for information processing from the first

    storage device if it has to executed by the second storage device based on

    cooperation control information which indicates a request to be executed by the

second storage device (e.g. see Col.9, lines 41-51), wherein the first and second

storage device control RAID level 4 or 5 (e.g. see Col. 3, lines 61-65).

Furthermore, Judd teaches that if the data request is made, the second storage

device requests the first storage device to send stored data connection with the data

write request to the second storage device and stores data sent from the first storage

device (e.g. see the abstract). However, Judd does not teach that if the request is a

data write request, the first storage device receives data connection with the data write

request, stores the data, makes another data to be used for making parity data in the

second storage device and sends the another data to be second storage device,

wherein the second storage device receives the another data, makes parity data based

on the another data and stores the parity data. Kakuta, on the other hand, teaches that

when new data for writing is sent from a host device, old data and old parities are read

after a search time respectively, and a new parity is generated with the new data, the

old data and the old parities, and the new parity is stored in a cache memory (e.g. see

abstract). Accordingly, it would have been obvious to one of ordinary skill in the art at

the time of the current invention was made to modify Judd's system so whenever the

data write request is sent from the host, the first device makes another data to be used

for parity data in the second device and sends to the second storage device as taught

by Kakuta. In doing so, the second device receives the necessary data to generate the

parity data. Using this parity data, the data of first and second storage devices can be

recovered in the event of a storage device failure. Therefore, it is being advantageous.

Similarly, if the system contains the third storage device, the parity data can be

generated and stored into the third storage device using the another data sent from the first storage device and the second storage device. Using this parity data, the data of first, second and third storage devices can be recovered in the event of a storage device failure. Based on this rationale, claims 6, 14 and 23 are rejected.

As per claim 7, Judd discloses the claimed invention as described above and furthermore, Judd teaches the storage subsystem, wherein the transceiver, means for transferring a request, transfers the received request to the second storage device when it is judged that the second storage device should execute the received request, based on cooperation control information which indicates a request to be executed by the second storage device (e.g. see Col. 9, lines 41-51). However, Judd does not teach that if the request is a data read request, the first storage device receives the read request, reads the data from the first storage device and sends the data and the request to the second storage device; the second storage device reads the data, merges the data read from the first and second device and sends the merged data to the host. However, RAID level 0 is well-known and notorious old in the art where the data is broken down into the blocks and each block is written to a separate storage disk drive. So when the data read request comes from the host, a block of data get read from each disk drive, merged and sent to the host. Accordingly, it would have been obvious to use the RAID level 0, which is well known, in the art in Judd's storage system since the RAID level 0 is (a) very simple design; (b) easy to implement; and (c) no parity calculation overhead is involved. Therefore, it is being advantageous.

As per claims 12 and 15, Judd discloses the claimed invention as described above and furthermore, Judd teaches the storage subsystem, wherein the transceiver, means for transferring a request, transfers the received request to the second storage device when it is judged that the second storage device should execute the received request, based on cooperation control information which indicates a request to be executed by the second storage device (e.g. see Col. 9, lines 41-51). However, Judd does not teach that if the request is a data read/write request and second storage device fails, the first storage device receives data and the request, sends data to the third storage device and the third storage device constructs the second data stored in the second storage device using the data, request and the parity data; and sends the data to the host device if the request is read request and sends the parity data to the third storage device if the request is write request. Kakuta, on the other hand, teaches that when a failure occurs at any one of the storage devices, for example, second storage device, all the data in the failed drive can be reconstructed from the data in the rest of the drives and the parity drive (third storage device) (e.g. see Col. 9, lines 60 et seq. and Fig. 5). Accordingly, it would have been obvious to one of ordinary skill in the art at the time of the current invention was made to modify Judd's system as taught by Kakuta so whenever a storage device fails, the data of that particular storage device can be reconstructed/recovered using other storage devices and parity device.

10.   Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Judd in view of Polyzois et al. (USPN: 5,432,922) hereinafter, Polyzois.

As per claim 10, Judd discloses the claimed invention as described above and furthermore, Judd teaches that the first and the second storage devices control RAID level 1 (e.g. see Col. 3, lines 61-65). However, Judd does not teach that if the request is a data write request, the first and second storage device receives data connection with the data write request and stores data sent from the host computer synchronously. Polyzois, on the other hand, teaches that if the data block is not written to the storage device, that data block is written synchronously to both the first storage device and the second storage device (e.g. see Col. 5, lines 34-43). This is also known as disk mirroring or duplexing (RAID 1). Accordingly, it would have been obvious to one of ordinary skill in the art at the time of the current invention was made to modify Judd's system so whenever host sends data write request, the data is written to both (first and second) storage devices synchronously as taught by Polyzois. In doing so, the write transaction rate doubles, which improves the performance of the overall system.

Allowable Subject Matter

11.   Claims 5, 13 and 21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Remarks

12.   As to remark, Applicant asserted:

(a)   With respect to claims 1, 9 and 17, Judd reference is silent with respect to

disclosing the claimed plurality of storage devices connected to a host

computer that control RAID level cooperatively.

(b)   With respect to claims 3-4, 6-8, 10-12, 14-16, 19-20, 23 and 24, none of

the secondary references of Sato, Katuta, Polyzois disclose or suggest the

deficiency in the Judd reference with respect to teaching that each of the

plurality of storage devices control RAID level cooperatively.

Examiner respectfully traverses Applicant's remark for the following reasons:

First of all, Examiner would like to emphasize that as stated in the title and

the abstract, the invention of Judd is clearly related to and involved a storage system

comprising a plurality of storage devices connected to a plurality of host computers.

With respect to (a) and (b), Judd teaches that the disk drives (the storage

devices) are arranged in one or more arrays, such as RAID 0, RAID 1, RAID 3 or

RAID5, or a JBOD (e.g. see Col. 3, lines 61-65), i.e. at any given time each of the

plurality of storage devices has to function and control RAID level cooperatively.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time

policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hetul Patel whose telephone number is (703) 305-6219. The examiner can normally be reached on M-F 8-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt Kim can be reached on (703) 305-3821. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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